WHAT IS CLAIMED IS:

1. A Fabry-Perot laser device for providing a wavelength-division-multiplexed optical signal to an optical transmission link, comprising:

an optical circulator having a plurality of ports for outputting light circulating in an optical waveguide loop;

at least one optical fiber amplifier disposed in the optical waveguide loop for amplifying light circulating in the optical waveguide loop;

a laser light source coupled to the optical circulator via one of the plurality of ports to receive light circulating in the optical waveguide loop and, in response, for outputting wavelength-locked light to the optical circulator; and,

a first splitter coupled to the optical circulator via one of the plurality of ports for splitting a portion of the light outputted from the circulator to the optical transmission link.

2. The Fabry-Perot laser device of Claim 1, wherein the laser light source comprises:

a wavelength division multiplexer for demultiplexing light received from the optical circulator via one of the plurality of ports; and,

a plurality of Fabry-Perot lasers coupled to receive the demultiplexed light and for outputting wavelength-locked light signals having self-seeded wavelengths back to the wavelength division multiplexer for multiplexing the wavelength-locked light back to the optical circulator.

3. The Fabry-Perot laser device of Claim 2, wherein a wavelength interval between the light signals from the plurality of Fabry-Perot lasers is substantially narrower than a channel interval of the wavelength division multiplexer.

4. The Fabry-Perot laser device of Claim 2, wherein the wavelength division multiplexer comprises a waveguide grating router.

5. The Fabry-Perot laser device of Claim 1, wherein the optical fiber amplifier comprises:

first and second amplifying optical fibers connected in series in the optical waveguide loop for amplifying the circulating light using a stimulated emission of rare earth elements;

a pumping light source outputting a pumping light having a preset wavelength to the first and second amplifying optical fibers; and,

a second splitter for splitting the pumping light to the first and second amplifying optical fibers, respectively.

6. The Fabry-Perot laser device of Claim 5, wherein the first and second amplifying optical fibers comprises erbium-doped fibers.

7. The Fabry-Perot laser device of Claim 5, wherein the pumping light source comprises a laser diode.

8. The Fabry-Perot laser device of Claim 5, wherein the second splitter splits the pumping light so that the first and second amplifying optical fibers are reversely pumped by the pumping light source.

9. The Fabry-Perot laser device of Claim 5, wherein the optical fiber amplifier further comprises a first optical isolator coupled between the first splitter and the first amplifying optical fiber, a second optical isolator coupled between the first and second amplifying optical fibers, and a third optical isolator coupled between the second amplifying optical fiber and the optical circulator for allowing the circulating light to pass therethrough in a forward direction while suppressing a light progressing in a reverse direction.

10. The Fabry-Perot laser device of Claim 5, further comprising a band-pass filter having a bandwidth equal to the circulating light and located between the first and second amplifying optical fibers for eliminating an amplified spontaneous emission noise deviating from the circulating light.

11. The Fabry-Perot laser device of Claim 10, wherein the band-pass filter is further operative to suppress dispersion effect from the circulating light.

12. The Fabry-Perot laser device of Claim 2, further comprising a polarization controller coupled between the optical circulator and the wavelength division multiplexer for controlling polarization of the multiplexed optical signal progressing between the optical circulator and the wavelength division multiplexer.

13. The Fabry-Perot laser device of Claim 2, further comprising a plurality of polarization controllers between the wavelength division multiplexer and the plurality of Febry-Perot lasers for controlling polarization of the demultiplexed light by the wavelength division multiplexer.